

A REVIEW OF THE GENUS *MASTACEMBELUS* (PERCIFORMES, MASTACEMBELOIDAE) IN CHINA WITH DESCRIPTIONS OF TWO NEW SPECIES AND ONE NEW RECORD

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Abstract This paper deals with the taxonomy of the genus *Mastacembelus* in China. Two new species, *Mastacembelus strigiventus* Zhou et Yang, sp. nov. and *Mastacembelus triolobus* Zhou et Yang, sp. nov., and a new record species for China, *Mastacembelus oatesii* (Boulenger) were described. Types were deposited in the Kunming Institute of Zoology (KIZ), Chinese Academy of Sciences and the Southwest Forestry University (SWFC). The diagnostic characteristics of *Mastacembelus strigiventus* sp. nov. are: dorsal, anal, and caudal fins almost entirely joined, but with distinct notches among dorsal-fin, anal-fin and caudal-fin outline; body sides and back with 4–5 zig-zag longitudinal lines and forming a network from front of anal origin to caudal base; a longitudinal brown line from the isthmus to anus on the abdomen or sometimes the line becoming a network. *Mastacembelus triolobus* sp. nov. can be distinguished from all congeners of the genus in China by the combination of the following characteristics: fewer dorsal, anal and caudal fin rays, dorsal and anal fins joined to caudal fin only near its base, caudal-fin outline entirely separate from that of dorsal and anal fins; sides of body lacking marbling, network, or irregular dark brown blotches, except with 14–15 dark blotches on its back, abdomen grey without stripe; HL less than 3.5 times of HW, and 2.8 times of snout length. *M. oatesii* differs from all congeners in the genus in China in having more caudal fin rays, fewer dorsal and anal fin rays; dorsal and anal fins joined to caudal fin only near its base, caudal-fin outline entirely separate from that of dorsal and anal fins; body with marbling or irregular dark brown blotches, abdomen light grey without lines or mesh patches; HL more than 4.0 times of HW, 3.0 times of snout length.

Key words Perciformes, *Mastacembelus*, new species, new record.

1 Introduction

Mastacembeloids or spiny eels are widely distributed in fresh waters of Africa, and East and South of Asia (Roberts, 1986). Only one species in the genus *Mastacembelus* Scopoli (1777), *M. armatus* (Lacépède), was recorded in China (Zheng, 1981; Zhu, 1985; Zheng, 1987). While editing The fishes of Yunnan, China (Part II) in 1988, the corresponding author compared samples of spiny eels collected from Southwest Yunnan with earlier records of China, and found that some specimens were not identical with the descriptions of the previous recorded ones. This prompted us to review the available specimens of *Mastacembelus* in China. The comparing results indicated that the undescribed species are significantly different from *M. armatus* in the joined degree of dorsal, anal and caudal fins, without or with stripes of different form, and the number of dorsal, anal and caudal rays. Two new species, *Mastacembelus strigiventus* sp. nov. and *Mastacembelus triolobus* sp. nov., and a new record species in China, *Mastacembelus oatesii* (Boulenger) are described below.

2 Materials and Methods

Methods for counts and measurements follow those of Roberts (1980, 1986), Travers (1984a, 1984b). Measurements were made with dial calipers to the nearest 0.1 mm. Counts and measurements were taken on the left side of specimens wherever possible. Abbreviations listed in the text and table are: ex., examined specimens; HL, head length; HD, head depth; HW, head width; SL, standard length; TL, total length; Co., county. Geographical coordinates, collectors and collecting dates are included for type specimens of the new species. Suffixes “-Jiang” or “-He” means river or stream in Chinese. Holotype materials examined in this study are deposited in Kunming Institute of Zoology (KIZ), Chinese Academy of Sciences, Kunming; some paratype materials deposited in Museum of Zoology, Southwest Forestry University (SWFC), Kunming.

3 Results

3.1 *Mastacembelus armatus* (Lacépède) (Figs 1, 6)

Macrogathus armatus Lacépède, 1800, 2: 86 (type locality unknown).

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Mastacembelus armatus: Valenciennes, 1832: 456; Herre, 1932, 11 (3): 426; Zheng, 1981: 228; Jin & Wu, 1985: 447; Zheng, 1987: 371; Zhou, 1990: 272.

Material examined. KIZ 748186 – 748187, 741356, 736048, 4 ex., 160 – 317 mm SL; Yunnan, Gengma Co., Mending and Menglian. KIZ 736029, 745150, 863499 – 863500, 863503, 863505, 6 ex., 240 – 349 mm SL; Yunnan, Mengla Co., Manzhuo, Mengla and Longmen. KIZ 644040 – 644041, 644043, 640656, 4 ex., 216 – 321 mm SL; Yunnan, Hekou Co., Hekou. KIZ 60052, 1 ex., 289 mm SL; Yunnan, Yuanjiang Co., Yuanjiang. KIZ 737044, 737046, 2 ex., 169 – 178 mm SL; Yunnan, Jingdong

Co., Jingdong. KIZ 776515, 805334, 3 ex., 206 – 368 mm SL; Yunnan, Guangnan Co., Guangnan. KIZ 805335, 1 ex., 146 mm SL; Yunnan, Funing Co., Boai. SWFC 060121, 1 ex., 224 mm SL; Yunnan, Jiangcheng Co., Kangping. SWFC 060122, 1 ex., 312 mm SL; Yunnan, Jinghong Co., Puwen. SWFC 093325, 1 ex., 114 mm SL; Yunnan, Gengma Co., Mengjian. SWFC 050517, 1 ex., 173 mm SL; Yunnan, Xinping Co., Mosha. SWFC 0903314 – 0903315, 2 ex., 84 – 127 mm SL; Yunnan, Zhenkang Co., Junsai. SWFC 060501 – 060504, 4 ex., 237 – 263 mm SL; Yunnan, Yuanjiang Co., Donge.



Fig. 1. *Mastacembelus armatus* (Lacépède).

Diagnosis. More dorsal-fin rays (68 – 78) and anal-fin rays (67 – 80), fewer caudal-fin rays (16 – 20). Dorsal, anal, and caudal fins entirely joined, caudal-fin outline merged with that of dorsal and anal fins. Stripes on the sides of body varied greatly, some with hexagonal meshes, some with intermittent zig-zag longitudinal lines, some with intermittent spots, and some lacking stripes or not obvious, with 15 – 20 large black spots on the back and the base of dorsal fin. Usually there are no marks or extensions of the network on the abdomen.

Morphometric data are shown in Table 1.

Distribution. River systems in Fujian, Taiwan and Hainan; the middle and lower reaches of Pearl River, Yuan Jiang (upper Red River), Lancang Jiang (upper Mekong) and Nu Jiang (upper Salween) (Fig. 5).

3.2 *Mastacembelus oatesii* Boulenger New record in China (Figs 2, 7)

Mastacembelus oatesii Boulenger, 1893: 199.

Material examined. KIZ 765497, 1 ex., 238 mm SL; Yunnan, Luxi City, Gazhong, near Zhefang Town (24°13'N, 98°14'E).



Fig. 2. *Mastacembelus oatesii* (Boulenger).

Diagnosis. Fewer dorsal rays [only 55 (range 48 – 56, according to Roberts, 1986)] and anal rays [only 60 (range 46 – 61)]; more caudal rays [22 (range 21 – 22)]. Dorsal and anal fins joined to caudal fin only near its base, caudal-fin outline entirely separated from that of dorsal and anal fins. Body uniform light brown with marbling or irregular dark brown blotches, back of body with 14 dark brown blotches, abdomen light grey without lines or mesh patches; base of caudal fin with a giant blotch. HL more than 4.0 times of HW and 3.0 times of snout length.

Morphometric data are shown in Table 1.

Distribution. Only known from Mangshi He (a

branch of Ruili Jiang), Irrawady drainage (Fig. 5). Only 1 specimen was collected since 1976. The fact implied that the species was either rare in the area or not caught by the usual sampling methods.

Remarks. *M. oatesii* was only known from Inle Lake, Myanmar (Roberts, 1986), where many endemic species inhabit. Their distribution is narrow and rarely found in other lakes or rivers. Although we had no opportunities to examine the types of *M. oatesii*, after comparing the material sampled from Mangshi-He with the original description of *M. oatesii* by Boulenger (1893), and the anatomy and examination results of *M. oatesii* by Travers (1984a) and Roberts (1986), the results indicated that our

Table 1. Morphometric data for *Mastacembelus strigiventus* Zhou et Yang, sp. nov., *M. triolobus* Zhou et Yang, sp. nov., *M. armatus* and *M. oatesii* in China.

<i>Mastacembelus strigiventus</i> Zhou et Yang, sp. nov.										<i>Mastacembelus triolobus</i> Zhou et Yang, sp. nov.					<i>Mastacembelus armatus</i>					<i>Mastacembelus oatesii</i>																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
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sample was much closer to *M. oatesii* than to the other species. Then we recognized it as *M. oatesii*. Therefore, it was recorded in China for the first time as well as outside of type locality. Only 1 specimen had been collected since 1950s and the fact indicated that this species was very scarce.

3.3 *Mastacembelus strigiventus* Zhou et Yang, sp. nov. (Figs 3, 8)

Holotype. KIZ 7801024, 280 mm SL, 297 mm TL; Yunnan, Yingjiang Co., Nabang (24°40'N, 97°34'E); HUANG Shun-You, Jan. 1978. Paratypes. KIZ 7801022 – 7801023, 2 ex., 169 – 280 mm SL, 179 – 187 mm TL; same datum as holotype. SWFC 060307, 1 ex., 257 mm SL, 270 mm TL; locality as holotype, ZHANG Qin, 7 Mar. 2006.



Fig. 3. *Mastacembelus strigiventus* Zhou et Yang, sp. nov.



Fig. 4. *Mastacembelus triolobus* Zhou et Yang, sp. nov.

Diagnosis. Dorsal rays 64 – 67, anal rays 63–66 and caudal rays 18. Dorsal, anal, and caudal fins almost entirely joined, but with distinct notches among dorsal-fin, anal-fin and caudal-fin outline. Body sides and back dark brown with 4 – 5 zig-zag longitudinal lines and forming a network from front of anal-fin origin to caudal-fin base; a longitudinal brown line from the isthmus to anus on the abdomen or sometimes the line becoming network.

Description. Dorsal-fin XXXVI – XXXVII, 64 – 67; Anal-fin III, 63 – 66. Caudal-fin 18.

SL 11.8 – 15.9 (14.2) times of BD, 18.5 – 24.4 (20.2) times of BW, 5.9 – 6.8 (6.3) times of HL, 2.1 – 2.4 (2.2) times of post-anal length. HL 3.6 – 4.4 (3.9) times of HW, 2.3 – 2.6 (2.4) times of snout length, 11.0 – 15.9 (13.2) times of eye diameter, 11.6 – 13.0 (12.3) times of interorbital width.

Body elongate and eel-like, somewhat cylindrical before origin of anal fin and slightly compressed after origin of anal fin. Dorsal and ventral profiles shallow curved. Head conical with a convex interorbital area. Snout pointed. Rim of anterior nostril with 2 fingerlike processes and 2 flaps; posterior nostril elliptical and close to eye. Eye small, not visible from ventral view. Preorbital spine extending posteriorly beyond vertical through anterior margin of eye. Mouth inferior; jaws

reaching posteriorly to vertical below posterior nostril; teeth sharp, well developed and forming bands in both jaws; lips fleshy, postlabial groove interrupted medially in lower jaw. Preoperculum with 3 spines. Gill opening large, both sides of gill membrane linked at anterior end of pre-opercular, not connected with isthmus.

Dorsal fin low and long, dorsal-fin origin on the middle pectoral fin vertically, the base length of dorsal-fin spine longer than that of dorsal-fin ray; spine small and free. Anal-fin origin located below the last 3 – 4 spines of the dorsal-fin spine, the distance from its origin to caudal-fin base shorter than distance from its origin to tip of snout. Anal-fin spine small, the 2nd spine largest. Dorsal, anal, and caudal fins almost entirely joined, but with distinct notches among dorsal-fin, anal-fin and caudal-fin outline. Pectoral fin short and fan-shaped, its origin close to the gill opening, the upper edge of the base higher than the upper corner of gill opening. Pelvic fin lost. The distance from anus to anal-fin origin is about 2 times of the eye diameter. Caudal fin rounded.

Gill covers, cheeks and snout almost entirely covered with small scales and occipital region of head scaleless. Body covered with small scales. Lateral line complete. No gill rakers and false gills.

Color pattern. In formalin, body sides and back

dark brown; back of body with 8 – 9 black blotches before the origin of soft-rayed dorsal fin; sides of body with 4 – 5 zig-zag longitudinal lines; inferior one usually broken up, the others may join to form a network from front of anal origin to caudal base; abdomen grey, there is a longitudinal brown line from the isthmus to anus on the abdomen or sometimes the line becoming network on the abdomen; check and gill cover with short irregular brown lines; a narrow longitudinal black stripe running from rostral, across eye to the superior angle of gill cover; base of fins dark gray, their outer fringes light grey; pectoral-fin with brown spots.

Morphometric data are in Table 1.

Distribution. Only known from Nabang-He (a branch of Nmai Hka River), Irrawady drainage.

Only 4 specimens were collected since 1978. Therefore, the species could be either rare in the area or might not be caught by the usual sampling methods.

Etymology. *strig-* (Latin): stripe, line; *vent-* (Latin): venter or abdomen; referring to its abdomen with a stripe or network. Used as an adjective.

3.4 *Mastacembelus triolobus* Zhou et Yang, sp. nov. (Figs 4, 9)

Holotype. KIZ 764223, 391 mm SL, 409 mm TL; Yunnan, Tengchong Co., Tuantian (24°41'N, 98°39' E); HUANG Shun-You, Apr. 1976. Paratypes. KIZ 764222, KIZ 764224, 2 ex., 311 – 355 mm SL, 332 – 388 mm TL; same data as holotype.

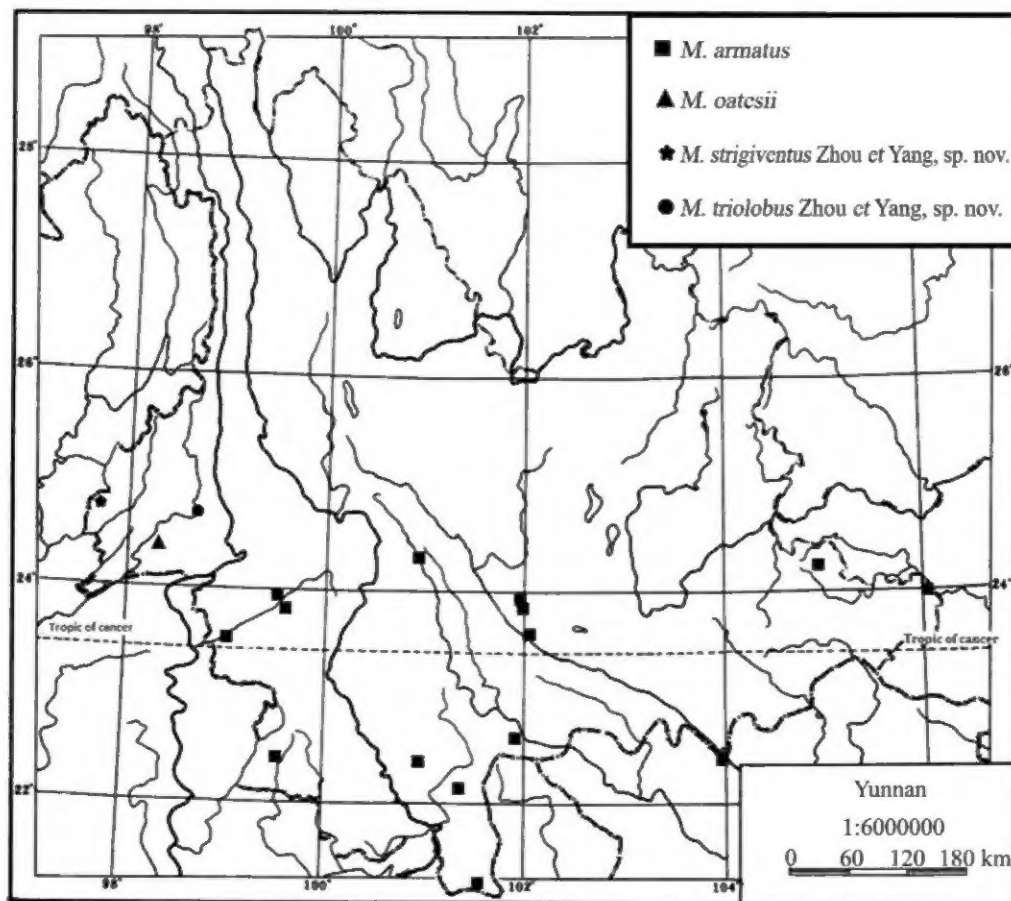


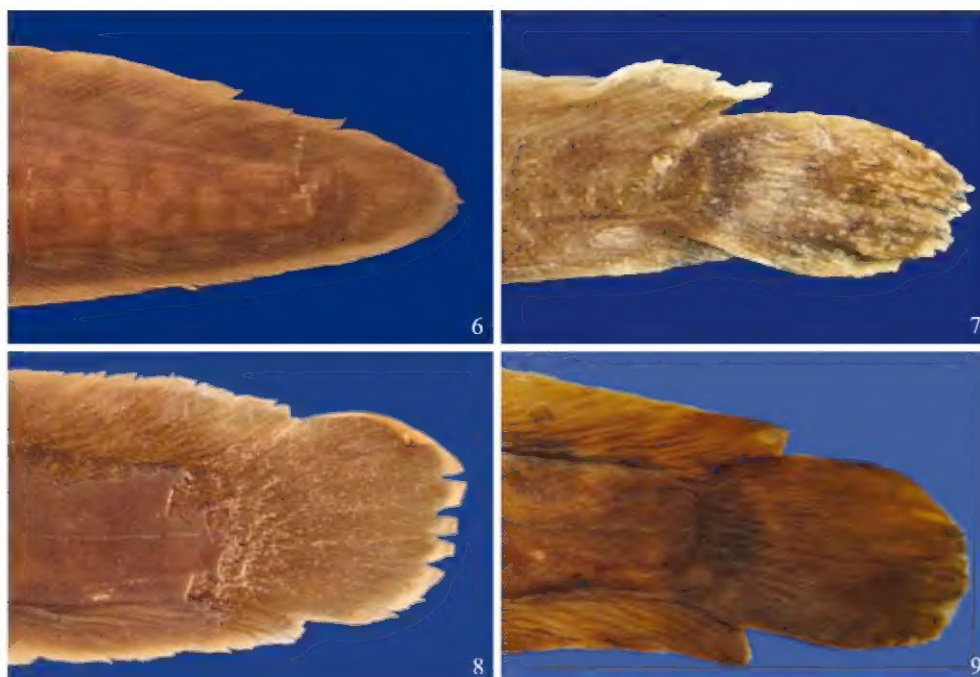
Fig. 5. Map showing distribution of *Mastacembelus armatus*, *M. oatesii*, *M. strigiventus* Zhou et Yang, sp. nov. and *M. triolobus* Zhou et Yang, sp. nov. in China.

Diagnosis. Fewer dorsal rays (56 – 60) and caudal rays (17 – 19). Dorsal and anal fins joined to caudal fin only near its base, caudal-fin outline entirely separated from that of dorsal and anal fins. Sides of body lacking marbling, hexagonal meshes, or irregular dark brown blotches except with 14 – 15 dark blotches on its back; abdomen grey without a line or hexagonal meshes. HL less than 3.5 times of HW and 2.8 times

of snout length.

Description. Dorsal-fin XXIII – XXV, 56 – 60; anal-fin III, 55 – 59, caudal-fin 17 – 19.

SL 12.7 – 14.9 times of BD, 19.7 – 22.9 times of BW, 6.1 – 6.7 times of HL, 2.1 – 2.3 times of post-anal length. HL 3.4 – 3.5 times of HW, 2.7 – 2.8 times of snout length, 12.8 – 14.5 times of eye diameter, 13.3 – 13.8 times of interorbital width.



Figs 6–9. Caudal fin outline of *Mastacembelus* in China. 6. *M. armatus*. 7. *M. oatesii*. 8. *M. strigiventus* Zhou et Yang, sp. nov. 9. *M. triolobus* Zhou et Yang, sp. nov.

Body elongate and eel-like, somewhat cylindrical before origin of anal fin and slightly compressed after origin of anal fin. Dorsal and ventral profiles gently convex. Head conical with a convex interorbital area. Snout pointed. Rim of anterior nostril with 2 fingerlike processes and 2 flaps; posterior nostril elliptical and close to eye. Eye small, not visible from ventral view. Preorbital spine extending posteriorly beyond vertical through anterior margin of eye. Mouth inferior; jaws reaching posteriorly to vertical below posterior nostril; teeth sharp, well developed and forming bands in both jaws; lips fleshy, postlabial groove interrupted medially in lower jaw. Preoperculum with spines or distinct coarseness. Gill opening large, both sides of gill membrane linked at anterior end of pre-opercular, not connected with isthmus.

Dorsal fin low and long, its origin near pectoral fin vertically, the base length of dorsal-fin spine longer than that of dorsal-fin ray; spine small and free. Anal-fin origin located below the last 4–5 spines of the dorsal fin, the distance from its origin to caudal-fin base shorter than distance from its origin to tip of snout. Anal-fin spine small and the 2nd spine longest. Dorsal and anal fins joined to caudal fin only near its base, caudal-fin outline entirely separated from that of dorsal and anal fins. Pectoral fin short and fan-shaped, its origin close to the gill opening, the upper edge of the base higher than the upper corner of gill opening. Pelvic fin lost. The distance from anus to anal-fin origin about 2 times of the eye diameter. Caudal fin rounded or truncated.

Gill covers, cheeks and snout almost entirely

covered with small scales and occipital region of head scaleless. Body covered with small scales. Lateral line complete. No gill rakers and false gills.

Color pattern. In formalin, back of body dark brown; abdomen grey, with 14–15 black blotches on back of body. Pectoral fin pales, with light brown irregular spots, the other fins dark brown.

Morphometric data are shown in Table 1.

Distribution. Known from Long-Jiang (a branch of Ruili-Jiang), Irrawady drainage (Fig. 5). Only 3 specimens were collected since 1976. The species could be either rare in the area or might not be caught by the usual sampling methods.

Etymology. *tri* (Greece): three; *lob* (Greece): lobule; alluding to its dorsal, anal and caudal fins almost entirely separated, the outline looks as three lobes. Used as an adjective.

Key to species of genus *Mastacembelus* in China.

1. Dorsal, anal and caudal fins broadly joined, caudal fin outline merged with that of dorsal and anal fins (Pearl River, Yuan Jiang, Lancang Jiang, Nu Jiang, river systems in Fujian, Taiwan and Hainan) *Mastacembelus armatus* (Lacépède)
Dorsal and anal fins separate from caudal fin, or joined to caudal fin only near its base, caudal fin outline entirely or almost entirely separate from dorsal and anal fins 2
2. Dorsal spines 36–37; dorsal and anal rays more than 60; caudal confluent with dorsal and anal fins almost entirely, but marked by distinct notches; abdomen with a longitudinal line or sometimes the line becoming network (Nabang-He, Yunnan, Irrawaddy drainage) *Mastacembelus strigiventer* Zhou et Yang, sp. nov.
Dorsal spines 33–34; abdomen without a line or network; counts of dorsal and anal rays less than 60; dorsal and anal fins joined to caudal fin near its base and caudal fin outline separate from dorsal and anal fins conspicuously 3
3. Body uniform light brown with marbling or irregular dark brown

blotches; caudal rays 21–22; HL more than 4.0 times of HW, 3.0 times of snout length (Mangshi-He, Yunnan, Irrawaddy drainage)

..... *Mastacembelus oatesii* Boulenger
Body without marbling or irregular dark brown blotches on side, except its back with 14–15 dark blotches; caudal rays 18; HL less than 3.5 times of HW, 2.8 times of snout length (Long-Jiang, Yunnan, Irrawaddy drainage)

..... *Mastacembelus triolobus* Zhou et Yang, sp. nov.

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中国刺鲃属鱼类分类整理及两新种和一新纪录 (鲈形目, 刺鲃科)

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摘要 系统整理了中国刺鲃属鱼类 *Mastacembelus*, 记述 2 新种, 腹纹刺鲃 *M. strigiventus* Zhou et Yang, sp. nov. 和三叶刺鲃 *M. triolobus* Zhou et Yang, sp. nov. 及中国 1 新纪录种, 云斑刺鲃 *M. oatesii* (Boulenger)。新种模式标本分别保存于中国科学院昆明动物研究所 (KIZ) 鱼类标本库和西南林业大学 (SWFC)。腹纹刺鲃与三叶刺鲃、大刺鲃的区别在于: 背鳍、臀鳍与尾鳍基部大部愈合, 但具缺刻相区分; 体侧前部具 4~5 条褐色纵条纹, 最下 1 条常断续, 全部纵纹至肛门前方渐成网格交叉或断续; 腹面亦具 1 条明显褐色纵纹, 有时分歧形成小网格。三叶刺鲃区别于腹纹刺鲃及大刺鲃的主

要特征包括: 背鳍条、臀鳍条和尾鳍条数目均少; 背鳍、臀鳍与尾鳍仅在基部相连, 在端部分开, 能明显区分; 除背部的黑色大斑块外, 体无六角状环纹或锯齿状纹, 腹面亦无斑纹; 头长为头宽 3.5 倍以下, 为吻长 2.8 倍以下。云斑刺鲃以下面组合特征区别于三叶刺鲃和腹纹刺鲃: 背鳍条、臀鳍条数目均少, 尾鳍条数目相对较多; 背鳍、臀鳍与尾鳍仅基部愈合; 体侧具云状斑, 背部具 14~15 个褐色斑块, 腹面无纵纹或网眼斑; 头长为头宽 4.0 倍以上, 为吻长 3.0 倍以上。

关键词 鲈形目, 刺鲃属, 新种, 新纪录。

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